Energy for the Olympics: In the Beijing-Guanting wind park, 43 wind turbines are in operation that were built by VENSYS Energy AG in Saarland, Germany – using inductive uprox+ sensors

Nose to the Wind

uprox+ sensors control the rotor position on VENSYS wind turbines

During the Olympic Summer Games in August 2008, China appeared as an environmentally-friendly host. In addition to the use of solar energy and terrestrial heat, the organizers relied primarily on wind energy, which alone was intended to cover 20 percent of the energy demand of all Olympic event facilities. The electricity is generated in the Beijing-Guanting Wind Park where 43 wind turbines from Chinese wind energy market leader Goldwind are in operation. The wind turbines are provided by VENSYS Energy AG produced 7,000 km away in the city of Saarland, Germany.

Worldwide growth

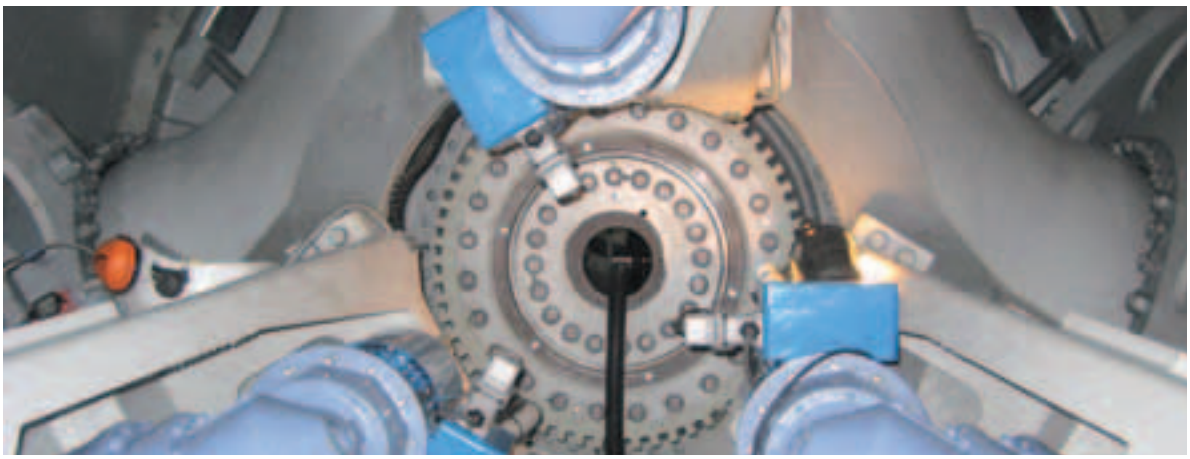
VENSYS wind turbines that were built and tested in Saarbrücken, Germany, are currently turning in the Canadian Higgins Mountain Wind Plant, as well as in the German city of Grevenbroich. This year alone, Chinese partner Goldwind is planning to put three plants into operation with more than 1,000 wind turbines. Other licensees are implementing innovative development ideas in Brazil, India, the Czech Republic and Spain.

The market opportunities for VENSYS wind turbines are particularly lucrative because the generator design and construction allows for sufficient wind production even in low wind regions, believes Board member Dietmar Knuenz. The exciter field is generated by the permanent magnets made of neodymium-iron-boron (NdFeB) attached directly on the rotor shaft. Therefore, energy normally used to excite the rotor can now be sent to the grid. “In the design of our wind turbines, we rely on constant part reduction by limiting turbine construction to a few high quality and tested components,” explains Knuenz. “The VENSYS generator fulfills all the functions of the classic drive train. We no longer use high-maintenance components that are prone to malfunction, such as transmissions, intermediate shaft and couplings. By using permanent magnets, we no longer need excitation coils, slip ring transmission and DC generation.” The pitch drive with low-wear toothed belts led to further savings, making lubrication and sealing redundant.

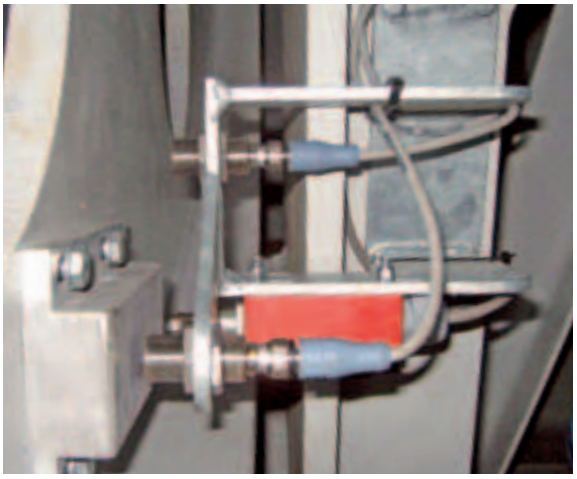
VENSYS Energy AG does not only set new standards when it comes to reliability and maintenance-

Quick read

With an innovative generator design, the Saarland-based VENSYS Energy AG made it all the way to Beijing. For the Summer Olympic Games, 43 VENSYS wind turbines – built by the Chinese licensing partner Goldwind – provided environmentally friendly electricity. To achieve this, uprox+ sensors from Turck guaranteed a consistently optimal rotor position.



All VENSYS plants have a second method of independently recording the rotor speed: It involves two uprox+ sensors working together with a toothed washer



Two uprox+ sensors record a special cam to reliably determine the current position of the blade angle

friendliness, it makes no compromises in terms of safety. With regard to safety, the pitch control system is among the most important components of a wind turbine. The system measures, monitors and controls the working angle of the rotor blades on a wind turbine which can change the power consumption. For example, pitch control allows the rotor blades to turn into the wind when starting up. During operation, the output can be held constant despite changing wind conditions by adjusting the working angle. However, if a storm gets up, the pitch control rotates the rotor blades automatically out of the wind in order to prevent damage.

Sensors guarantee reliability

"A malfunction can have fatal consequences," says Dr. Stephan Joeckel, Director of Electro-Technology at VENSYS. No wonder that the reliability of the measurement technology in this field is the highest priority. That is the reason why VENSYS Energy AG decided in favor of inductive sensors from Turck. In each wind turbine, six uprox+ sensors – two on each blade – simultaneously determine the precise position of the rotors. To do so, each sensor records the end position of the rotor blades. A seventh sensor determines the position of the maintenance hatch of the turbine. With the data from all the sensors, the control system then ensures that each rotor blade is in the correct position. The power is transmitted between the motor and the rotor blade via a lubricant-free and maintenance-free toothed belt. In this process, the power is distributed across several teeth, thus minimizing wear and increasing safety and reliability.

In 2007 alone, VENSYS equipped 60 wind turbines with Turck sensors without encountering any difficulties. "So far, we have only had good experiences," confirms Dr. Joeckel. "In addition to the high level of reliability, high quality and an attractive price-performance ratio, the high resistance to the high EMC was also an important factor in the decision in favor of the uprox+ sensors. Because of their direct proximity to the generator of the wind turbines and the risk of lightening, the topic of EMC plays a significant role in this application area."

Resistant and impermeable

Because wind power plants are frequently located in coastal regions with relatively high particulate concentrations, all plant components must meet particularly high requirements when it comes to impermeability. Here, too, the uprox+ series was able to score some points: In the standard design, the sensors are encapsulated in a chrome-plated brass housing with an IP68 degree of protection and meet the high requirements of the VENSYS developers.

Sensors that are to be used in offshore plants out on the open sea have to be even more resistant to aggressive salty and moist air. While those types of VENSYS wind parks have not yet been developed, the Turck sensors are already best prepared for such a scenario. Even today, uprox+ sensors with enormously resistant and especially impermeable stainless steel housings are being used in the food industry where they have successfully withstood aggressive cleansing agents for years.

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Author

Markus Renner is a Sales Specialist at Turck Germany